

Fig. OM1. Diagram showing variations in the concentrations of As and Au (in ppm) within arsenian pyrite from the Qiucun deposit.

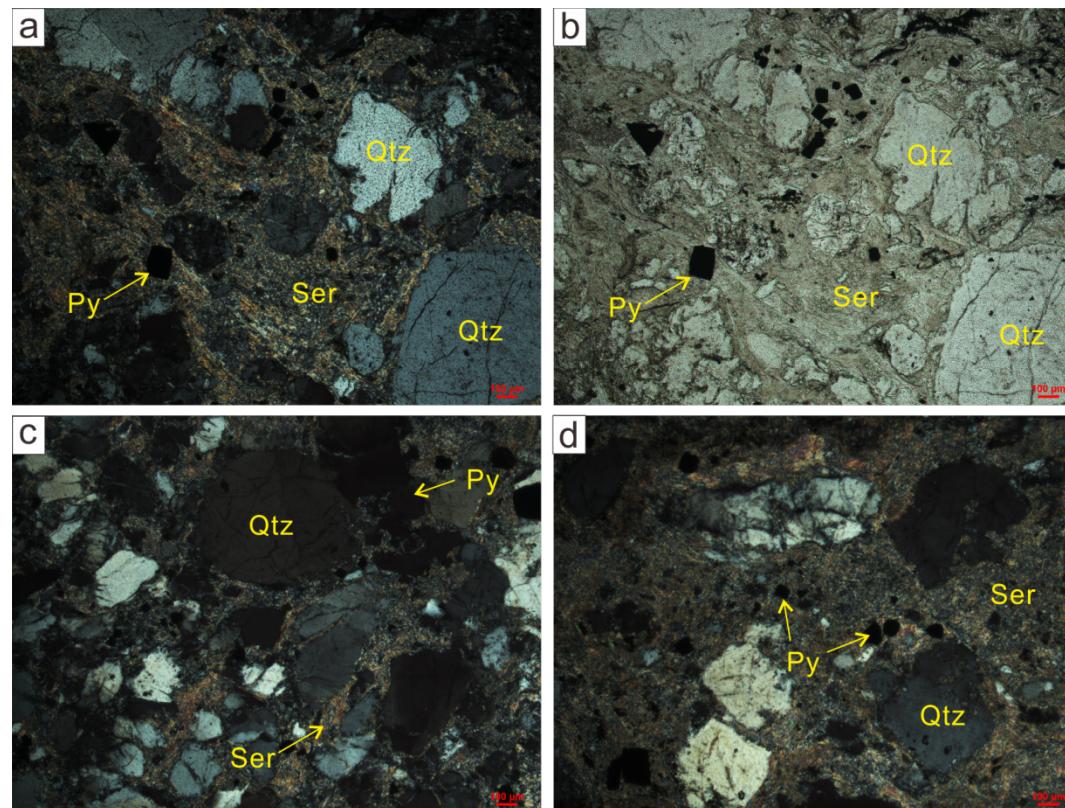


Fig. OM2. Photomicrographs of polished thin-sections taken under cross-polarized light (a, c–d) and plane-polarized light (b) showing representative examples of mineralization within the Qiucun deposit. Abbreviations: Qtz = quartz, Py = pyrite, and Ser = sericite.

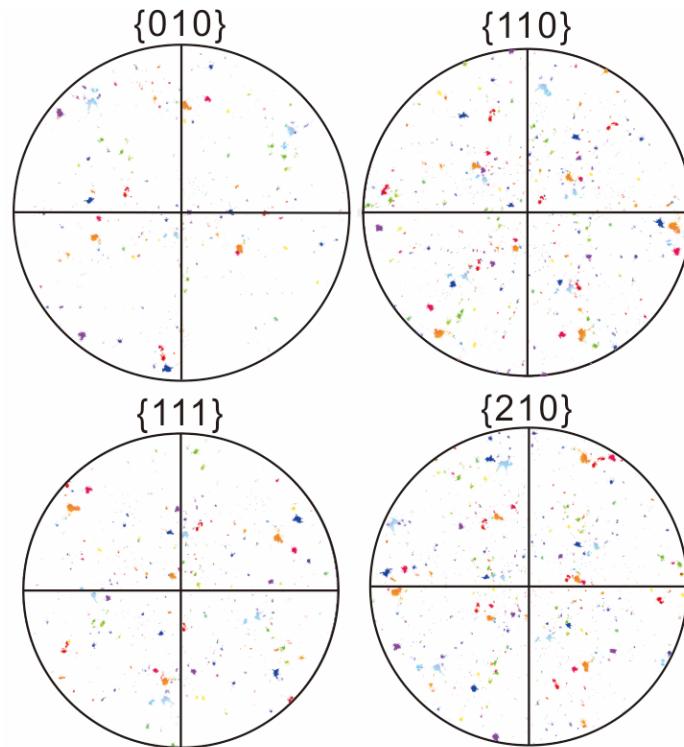


Fig. OM3. The scattered pole figures for pyrite grains shown in Figure 6. These pole figures show the random distribution of pyrite grain orientations.

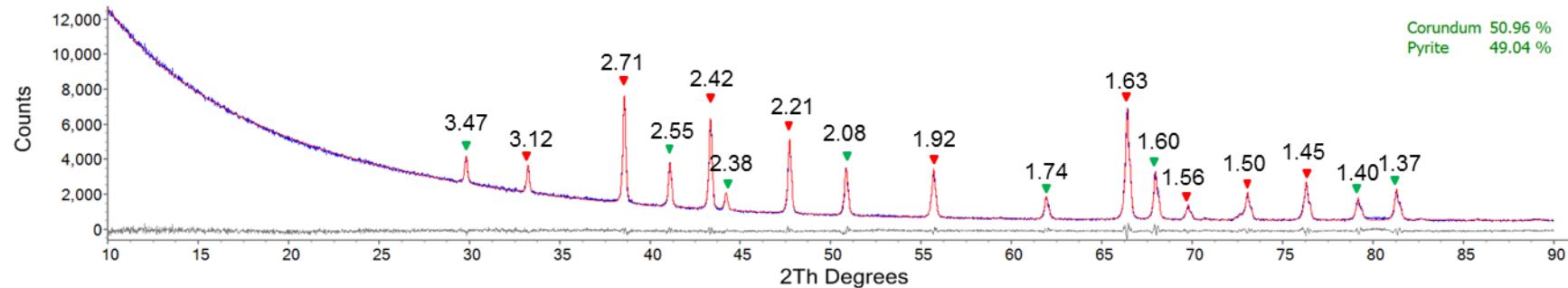


Fig. OM4. Quantitative XRD analysis of the sample arsenian pyrite from the Qiucun deposit using TOPAS. The corundum was added as the internal standard in this test. The weight percentage of each mineral phase in this figure is rounded to the nearest whole number. d-spacing values for the peaks of arsenian pyrite (red triangle) and corundum (green triangle, experimental data) are also given in this Figure, respectively. Blue line: experimental data; Red line: fitted data.

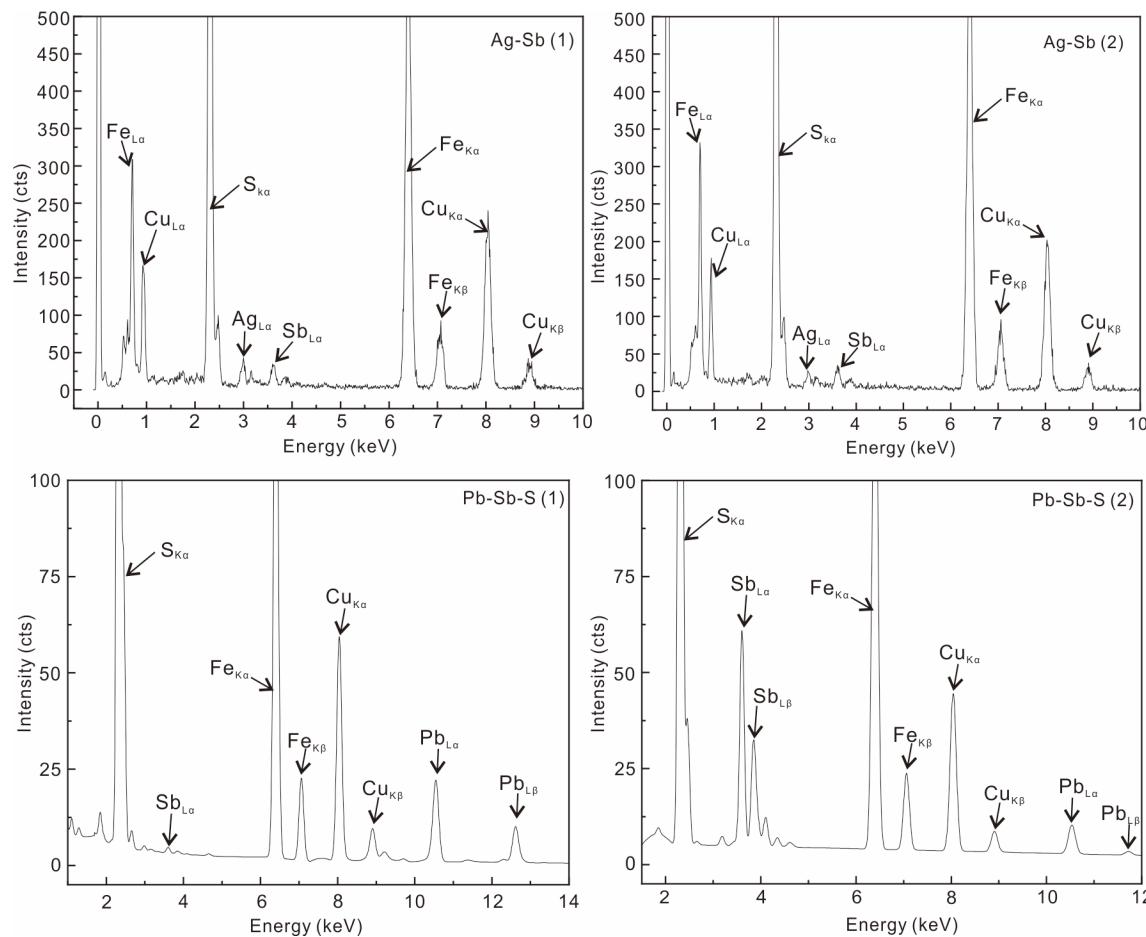


Fig. OM5. Representative EDS spectra for the nanoparticles shown in the HAADF-STEM images. The spectra confirm the presence of As-Sb and Pb-Sb-S nanoparticles within arsenian pyrite.

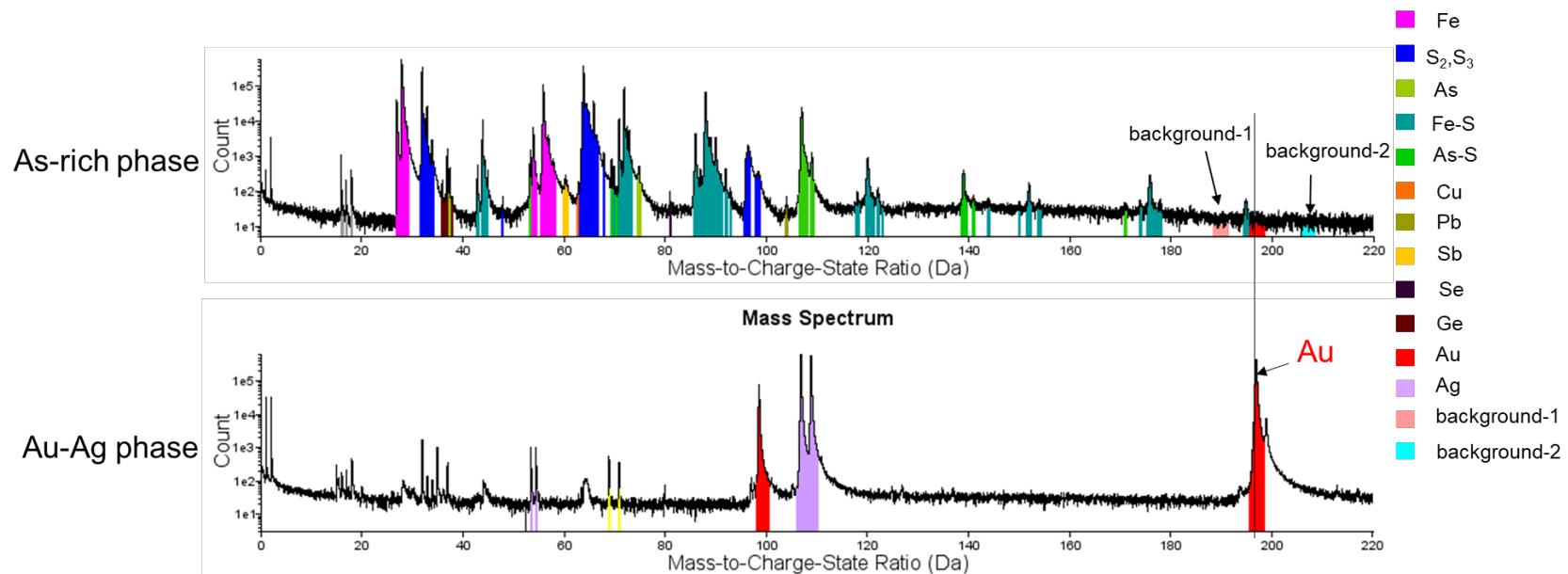


Fig. OM6. Mass to charge ratio spectra for the As-rich phase (S1) and the Au-Ag phase (S3) from the Qiucun deposit by atom probe tomography, with two backgrounds selected for calculating detection limit of gold. The gold (Au^+) peak in the As-rich phase is not significant comparing with the background.

Table OM1. Chemical compositions (in ppm) of pyrite from the Qiucun gold deposit by LA-ICP-MS.

No.	Si	S	Fe	Co	Ni	Cu	Zn	As	Se	Ag	Sb	Te	Au	Pb
QCPY-1	149	524207	451405	4.39	4.36	149.44	3	23247	6.68	26.95	17.13	b.l.	22.7	81.88
QCPY-2	72	530565	453546	0.18	0.64	101.08	1	15630	9.59	45.86	6.56	0.18	13.2	7.03
QCPY-3	28	519327	447593	0.42	0.67	120.77	b.l.	32815	7.85	9.4	3.22	b.l.	22.9	4.83
QCPY-4	b.l.	557399	422631	192.17	196.67	74.54	18	18372	b.l.	58.41	244.73	b.l.	15.4	91.25
QCPY-5	351	520499	446607	44.43	16.5	110.65	3	32037	7.39	11.99	8.12	0.04	41.9	28.7
QCPY-6	b.l.	516124	476117	21.28	11.75	21.94	1	7542	3.48	29.62	13.09	b.l.	4.2	90.19
QCPY-7	47	509562	478023	1.8	1.71	299.91	98	11622	6.26	64.1	62.78	1.9	26.2	153.33
QCPY-8	935	517579	474110	110.72	15.99	54.81	10	6693	2.87	53.11	30.76	1.03	3.6	102.36
QCPY-9	250	504300	450484	0.48	0.37	181.14	b.l.	44602	9.47	21.32	23.59	1.11	49.4	69.99
QCPY-10	1408	527610	459360	31.06	21.07	57.27	308	1007	4.49	449.89	11.65	151.59	25.2	9414.04
QCPY-11	851	520332	469136	327.12	74.98	284.42	62	8223	4.19	81.91	58.2	4.91	11.1	299.81
QCPY-12	194	509763	450310	0.28	0.5	253.09	b.l.	39190	6.65	8.35	29.4	b.l.	86.4	85.35
QCPY-13	38	508909	468118	20.84	16.34	244.74	1	22350	3.6	31.75	29.3	6.12	42.6	151.4
QCPY-14	80	484353	451170	146.51	135.66	560.47	1	63327	6.49	37.66	21.03	b.l.	153.5	7.04
QCPY-15	361	500399	494723	42.23	24.87	46.77	2	4042	4.19	37.12	29.19	2.35	3.1	171.97
QCPY-16	451.49	540834	454194	225.63	101.76	149.04	3.89	3577	0.99	18.48	6.11	0.11	1.05	47
QCPY-17	146.07	528770	469388	141.38	42.20	21.45	b.l.	1388	0.32	1.87	9.57	b.l.	0.21	76
QCPY-18	88.50	545720	452656	13.77	21.06	62.16	636.26	62	0.14	5.18	0.62	0.25	0.03	727
QCPY-19	88.88	526151	467072	110.82	28.13	48.92	0.17	6348	1.23	47.41	23.03	0.01	1.75	58
QCPY-20	151.72	521221	470554	535.36	81.00	295.96	0.31	6909	1.51	59.73	41.59	0.95	11.64	106
QCPY-21	175.89	530372	454856	14.08	7.63	2006.41	6.72	11060	6.72	542.34	358.42	b.l.	10.33	455
QCPY-22	b.l.	523011	471983	4.20	6.14	1723.43	66.08	2083	3.76	415.17	225.65	0.32	1.65	445
QCPY-23	167.70	532147	461393	263.54	40.37	1690.36	32.02	3220	4.70	375.15	214.30	0.45	3.90	386
QCPY-24	191.18	526839	472645	0.75	0.41	10.99	0.60	110	0.45	0.05	181.23	0.08	b.l.	8
QCPY-25	342.38	532195	455061	41.27	9.72	31.63	36.37	11604	0.00	3.87	506.72	b.l.	0.01	82
QCPY-26	97.31	537119	458383	1.88	2.02	55.98	1.92	3030	0.00	0.43	9.78	0.08	0.03	52
QCPY-27	236.70	534939	447843	19.79	13.54	143.47	1.81	15293	2.13	107.73	892.52	0.61	7.58	291
QCPY-28	4336.17	542718	447416	988.43	217.46	62.25	0.57	2442	2.91	18.02	12.92	0.18	1.18	112
QCPY-29	464.57	532057	449427	353.42	77.09	193.37	0.31	17076	4.62	31.19	29.77	0.17	16.84	123
QCPY-30	129	544791	454744	35.05	6.03	2	0.25	157	13.81	5.76	5.98	1.51	0.03	72
QCPY-31	118	535864	456736	51.61	185.79	221	0.71	6189	b.l.	67.61	27.64	3.47	7.85	480
QCPY-32	b.l.	535830	444425	0.26	0.75	7	17204	15	4.98	558.77	2.01	343.54	0.83	1360
QCPY-33	b.l.	574437	420148	69.01	47.48	42	1.23	5057	b.l.	7.63	19.26	5.01	5.67	70

Note: b.l. = below the detection limit.

Table OM2. Representative EMPA data (in wt%) of pyrites from the Qiucun deposit (No. 1–36) and the Dongyang deposit (No. 37).

No	Fe (0.02)	Co (0.03)	As (0.02)	S (0.006)	Ag (0.04)	Sb (0.04)	Ni (0.02)	Total
1	45.32	0.04	1.62	52.12	b.l.	b.l.	b.l.	99.11
2	45.24	0.02	2.68	51.35	b.l.	b.l.	b.l.	99.30
3	44.17	0.10	3.08	50.91	b.l.	b.l.	b.l.	98.28
4	45.08	0.05	3.26	51.17	b.l.	b.l.	b.l.	99.57
5	45.08	b.l.	0.43	52.77	b.l.	b.l.	b.l.	98.29
6	44.65	b.l.	2.88	51.40	b.l.	b.l.	0.02	98.97
7	44.42	0.06	4.12	49.76	b.l.	b.l.	b.l.	98.35
8	45.97	0.03	b.l.	53.14	b.l.	b.l.	b.l.	99.15
9	45.09	0.04	0.02	53.17	b.l.	b.l.	b.l.	98.32
10	46.11	0.04	b.l.	53.14	b.l.	b.l.	0.04	99.34
11	44.96	0.03	5.08	49.74	b.l.	b.l.	b.l.	99.81
12	45.47	b.l.	4.24	50.18	b.l.	b.l.	0.04	99.92
13	44.87	b.l.	3.46	50.22	b.l.	b.l.	b.l.	98.57
14	46.11	0.04	b.l.	53.07	b.l.	b.l.	b.l.	99.22
15	46.09	0.13	1.51	52.12	0.09	b.l.	b.l.	99.93
16	44.84	0.03	2.41	51.50	b.l.	b.l.	0.02	98.82
17	45.44	0.02	1.93	51.70	b.l.	b.l.	0.02	99.11
18	45.66	b.l.	1.32	52.21	0.04	b.l.	b.l.	99.24
19	45.22	0.06	1.73	51.99	b.l.	b.l.	0.06	99.05
20	46.25	0.08	0.20	53.33	b.l.	b.l.	b.l.	99.86
21	46.47	0.02	0.14	53.38	b.l.	b.l.	0.04	100.04
22	45.04	0.06	3.19	51.03	b.l.	b.l.	b.l.	99.34
23	44.74	0.05	2.14	51.69	b.l.	b.l.	0.02	98.66
24	45.41	0.04	1.97	51.65	0.06	b.l.	0.02	99.15
25	45.21	0.03	2.14	51.68	b.l.	b.l.	0.02	99.08

26	44.41	0.11	2.72	51.55	0.10	b.l.	b.l.	98.90
27	44.69	b.l.	3.86	50.73	b.l.	b.l.	b.l.	99.30
28	44.93	0.07	2.95	51.06	b.l.	b.l.	0.04	99.05
29	44.60	0.06	4.97	49.74	b.l.	b.l.	b.l.	99.37
30	44.83	b.l.	3.56	50.81	b.l.	b.l.	b.l.	99.19
31	45.93	0.11	b.l.	53.36	b.l.	b.l.	b.l.	99.39
32	44.46	0.04	4.79	49.78	b.l.	b.l.	b.l.	99.10
33	45.04	b.l.	3.78	50.90	0.05	b.l.	b.l.	99.77
34	45.37	b.l.	3.08	51.08	b.l.	b.l.	b.l.	99.56
35	45.34	0.09	3.92	50.16	b.l.	b.l.	0.02	99.55
36	45.35	0.03	1.84	51.79	b.l.	b.l.	b.l.	99.01
37	43.43	0.03	8.18	48.26	b.l.	0.76	b.l.	100.67

Note: b.l. = below detection limit; Detection limits are presented below each element label.

Table. OM3. Diffraction information from As-rich and –deficient pyrite domains

Phase	Diff no.	<i>hkl</i>	<i>d_{obs}</i>	<i>d_{calc}</i>	Δd	<i>a</i>
As-rich pyrite	2	1 1 0*	3.867	3.862	0.005	5.461
	3	1 0 0	5.445	5.461	-0.016	
	4	1 1 1	3.154	3.153	0.001	
	2	1 1 2	2.228	2.229	-0.001	
	2	1 2 2*	1.824	1.820	0.004	
	2	1 1 3	1.644	1.647	-0.003	
As-deficient pyrite	2	1 1 0*	3.818	3.834	-0.016	5.421
	3	1 0 0	5.412	5.421	-0.009	
	3	1 1 1	3.134	3.130	0.004	
	2	1 1 2	2.209	2.213	-0.004	
	2	1 2 2*	1.810	1.807	0.003	
	2	1 1 3	1.635	1.635	0	

Note: These d-spacings obtained (*d_{obs}*) from the SAED patterns for the As-rich and –deficient pyrite domains are compared with the refined unit cells (*d_{calc}*) based on an cubic structure. * refers to forbidden reflections in the *Pa3* space group. Diff no. is the number of diffraction patterns used for the corresponding *hkl*; Δd is the difference between *d_{obs}* and *d_{calc}*. *a* is the unit-cell parameter.

Table. OM4. Chemical compositions (in at%) measured by atom probe microscopy for As-rich domains of arsenian pyrite from the Qiucun gold deposit.

	S	Fe	As	Ge	Cu	Sb	Pb	Se	O	Au	Background-1*	Background-2*
Pyrite	63.77	34.55	1.57	0.033	0.006	0.015	0.002	0.002	0.027	0.0065	0.0066	0.0056

*Backgrounds 1-2 refer to two selected pieces of mass spectrum background for calculating detection limit in this test.